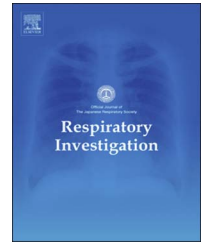




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Case report

An objective evaluation of nocturnal cough count and cough pattern in children with psychogenic cough

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ABSTRACT

Two patients with a chronic, barking cough were diagnosed with psychogenic cough. Using an original cough counter we studied the nocturnal cough count and pattern. While the number of coughs when awake was extremely high for both patients, the number of coughs was remarkably reduced during sleep, similar to an exacerbation of asthma. Moreover, the properties of the coughs when awake were clearly different from those of coughs during sleep. In conclusion, an objective examination using a cough counter was useful for the diagnosis, treatment and management of psychogenic cough.

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1. Introduction

Medical treatment guidelines for cough diseases in children have been previously published [1]. One of the cough diseases described in these guidelines is psychogenic cough, which is defined by a persistent dry-cough that is caused by psychological factors [2]. In such patients, coughs are expressed as barking or honking coughs, which stop when the patients are asleep [3]. We recently devised a new method of evaluating cough using an original cough counter [4,5]. In this report, we objectively calculated the number and pattern of nocturnal

coughs during hospitalization in two children who were diagnosed with psychogenic cough.

2. Case presentation

Patient #1, a 12-year-old boy, was visited our hospital to undergo investigation for chronic cough. He had been healthy all his life. When he consulted another hospital to undergo treatment for a cough that had lasted for 9 weeks, the physician considered the possibility of a psychogenic cough due to the cough characteristics. Although the patient did

Abbreviations: Dmin, Minimal dose of methacholine

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cough in the examination room, a barking cough was observed as soon as he entered the consulting room. Anti-microbial drugs and steroid inhalation had been prescribed, but they had no effect. His mother was not convinced by the explanation, and wished to consult another hospital.

A family history of diseases was recorded and it was noted that the patient's mother had been diagnosed with schizophrenia. No abnormality was observed for various tests (Table 1).

Patient #2, an 8-year-old boy, characteristics our hospital to undergo an investigation for a chronic, dry, barking coughing. He had been healthy all his life. When he consulted another hospital, steroid inhalation and a leukotriene receptor antagonist were prescribed based on a diagnosis of cough variant asthma. However, the patient showed no improvement. His

cough sounds gradually grew more apparent, and he was unable to attend school.

When he visited our hospital, the cough had already lasted for 12 weeks. His mother reported that his coughing began at the time of his grandmother's death, and ceased when he played his favorite games. The patient's family history included no relevant diseases. Various test results revealed no abnormalities (Table 1).

Investigations using our cough monitoring method were performed in both patients. Briefly, the cough monitor consisted of a high-resolution microphone (EM167NM2, Primo Co. Tokyo, Japan), a high-sensitivity accelerometer (S18, Primo Co. Tokyo, Japan), and a recorder (R-09HR, Roland Co. Hamamatsu, Japan) [4]. Cough sounds and thoracoabdominal movement were simultaneously recorded using two channels. The coughs were analyzed using an original software program. During hospitalization, all patients went to bed at 10:00 PM, at which point the measurement of the cough count was initiated. Sleep was confirmed using a fixed bedside video camera.

Approval for this study was obtained from the Tokai University Hospital Institutional Review Board for Clinical Research (project approval number: 09R-141), and written informed parental consent for each child was obtained before the study.

One of the difficulties in the identification and quantification of coughing using a cough counter is that the cough sound exhibits various patterns. A previous study using a sound signal examination suggested that a typical cough sound contains three phases of variable sound: the explosive phase, the intermittent phase, and the voiced phase (Fig. 1b)

Table 1 – Patient characteristics.

	Case 1	Case 2
Total serum IgE	76 IU/ml	64 IU/ml
Specific IgE ^a	All negative	All negative
Lung function test (FEV ₁ /FVC) × 100	88%	87%
FeNO	5 ppb	12 ppb
Chest X-ray	Normal	Normal
Methacholine inhalation test (Dmin)	49.95 units	49.95 units
Infection ^b	All negative	All negative

^a Aero allergens.
^b Pertussis, mycoplasma, *chlamydomphila* and tuberculosis.

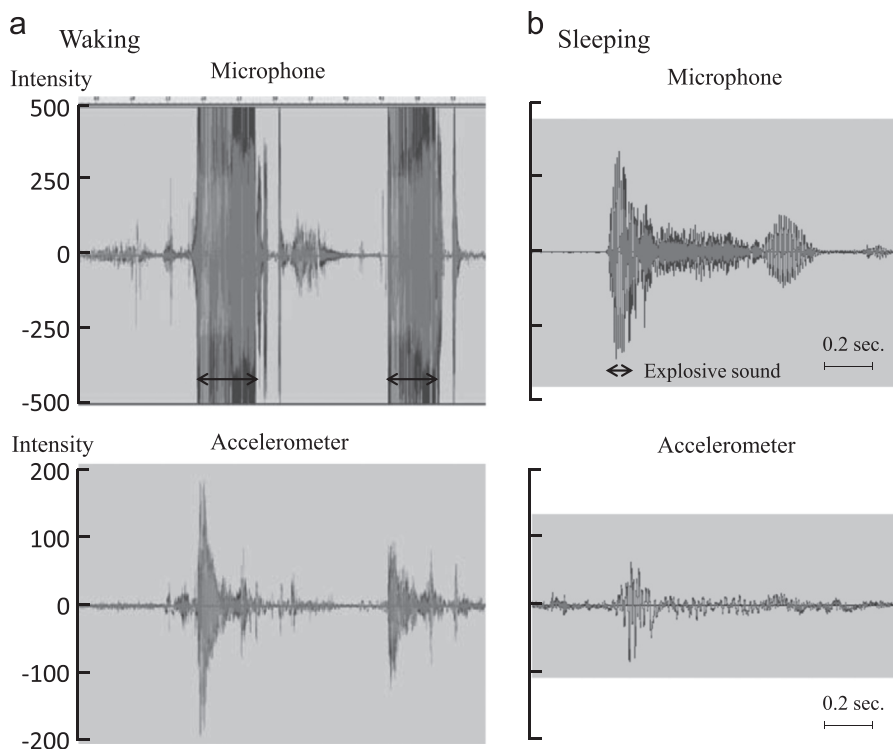


Fig. 1 – The sounds of psychogenic cough. (a) Awake phase: microphone signals were large and over-scaled. The explosive sounds (two directional arrow) of coughs were prolonged (duration: >0.3 s). The accelerometer signals were also enlarged. (b) Sleeping phase: microphone signals were within the common range. The explosive sounds of coughing were also within the common range (duration time: <0.15 s).

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